understood in these days, and it is impossible to assign correct meanings to them until we know the exact signification of every word which occurs in them.

The weak part of Mr. Schmidt's argument is that, even supposing all his statements about dates in the Sothic year were correct and could be proved, he does not allow a sufficient number of Sothic years to cover the long period of years in which the Egyptian civilisation was evolved, and developed, and matured, and decayed; and it seems to us absurd to limit this period to three Sothic years, or 4380 ordinary years. Mr. Schmidt's system of chronology is worth no more than any other in which a large amount of "playing at doing sums" occurs, and he has merely put together in book form a series of notes and extracts from the works of Egyptologists, and from those of writers like Bunsen and Cory, which he has arranged according to his own peculiar views; the result is a perfectly unreadable volume of 569 pages, in which the "omissions" of one ancient authority and the "mistakes" of another are paraded in a bewildering manner. We have no wish to be flippant or to treat Mr. Schmidt's book in other than a serious manner, but his conclusions remind us forcibly of the result of the investigations into the date of the building of the Tower of Babel of the eminent English divine who declared that the "last brick was laid on the top stage of the Tower of Babel at Borsippa at 4 p.m. on Thursday, April 15, B.C. 2247." We cannot possess a continuous and accurate chronology of Egypt until we know how many kings reigned between Mena and Nectanebus, and how many years each reigned, and who succeeded whom; to make such a chronology at present is impossible because the necessary data do not exist. The writer who assigns precise dates to certain events in Egyptian history, *e.g.* the date B.C. 4244 to "the establishment of the kingdom," probably deserves to be considered either a "crank" or a charlatan, and in any case the presumption of the writer who asserts definitely that the Ionians were settled on the shores of "Greece and Asia Minor as far back as the reign of Teta, or 3146 B.C." is stupendous.

We are not reassured on the matter of Mr. Schmidt's scholarship when we find such blunders and spellings as the following: Puon-et, p. 7, *uae* (there is no such word) p. 9, Hyk-sat-u, p. 13, Rokchoris, p. 14, Tarako, p. 14, Sothiac, p. 16 and *passim*, Sopdet, p. 17, Uon-nofer, p. 20, Ânu, p. 27, Ach-i-u, Ta-ân-nut, p. 30, Pa-api, p. 35, Amen-em-het, p. 49, Rohk-nez, p. 52, Num, p. 61, Usertasen, p. 81, Quebahu, p. 105, the identification of Ta-ânut (*sic*) with This, the derivation of the Hebrew name "Adam" from that of Mena, the first historical king of Egypt (!), p. 117, Hus-et and Hus-ir, p. 122, Per-son, p. 131, Osiropis, p. 253, Zawyet-el-Arrian, p. 268, Elephantinæn, *ibid.*; this list might be increased almost indefinitely. Mr. Schmidt looks upon the story of the Flood as an allegory which he interprets thus. Noah was born B.C. 2948, and the Flood "broke loose" over the land B.C. 2348; Thebes became independent B.C. 2948, and the XIth, XIIth and XIIIth dynasties of kings reigned exactly 600 years, *i.e.* a period equal to the age of Noah when the Flood "broke loose." According to Mr. Schmidt the Flood was no flood of water, but an invasion of Hyksos, and the ark to which Noah and his family, &c., fled was nothing else than the city of Thebes, because the Hebrew word for ark is *Têbhâh*, and this, according to Mr. Schmidt, is the name of the city called Thebes. The sending forth of the dove from the ark is another part of the allegory, and means that Noah and his sons sent forth from Thebes messengers to the Hyksos offering their submission, which was duly accepted, and payment of tribute imposed upon them!

From reasoning of this kind the reader will easily be able to gauge Mr. Schmidt's qualifications as a reformer of the chronology of Egypt; as a final proof of the correctness of his views on this subject he points triumphantly to the fact that the fifteen cubits of height above the mountains which the waters reached at the time of the Flood refers to the depth of the waters of the annual Nile inundation, which he declares to be exactly fifteen cubits at Heliopolis! When he deals with Babylonian questions Mr. Schmidt is equally unfortunate, for on p. 545 he gravely refers to the discovery of a tablet "recording the war waged by Khammurabi against Eri-aku and his Elamite allies"; a reformer of Mr. Schmidt's pretensions should at least have shown that he had read that this "discovery" was exploded finally by Mr. L. W. King in the first volume of his "Letters of Khammurabi," published in 1898, for, as now stated by Mr. Schmidt, his arguments fall to the ground. Before he writes another book of "startling discoveries" we hope he will read the current literature of the subject, and will remember that assertion is not evidence, and that theories and hypotheses are not proofs.

ELECTRO-CHEMISTRY.

Practical Electro-Chemistry. By G. Bertram Blount. Pp. xi+374. (Westminster: A. Constable and Co., Ltd., 1901.) Price 15*s.* net.

ALTHOUGH the foundation on which electro-chemistry is built was to a large extent laid by the genius and splendid research work of two Englishmen, Davy and Faraday, and is practically based on the laws enunciated by the latter, yet to-day, when many branches of industrial chemistry are being revolutionised by the introduction of this branch of chemical science, we as a nation know practically nothing about it. In America we are confronted by numerous works upon the subject; if we turn to Germany, there again we find a whole library of books devoted entirely to electro-chemical science and to its industrial application. Turning to our own country, what do we see? One or two books on electro-plating, books on electrical engineering, and a few *translations* of German works on electro-chemical analysis.

It was, therefore, with sincere pleasure and eager anticipation that one saw, in the publishers' announcements at the end of last year, that Messrs. Constable and Co. would shortly bring out a work on "Practical Electro-Chemistry," by Mr. Bertram Blount. The book which is now published consists of eight sections devoted to different branches of electro-chemistry.

The first, or introductory, section treats in an interesting manner of electrolysis and more or less of the theory of solution. A useful subsection is also given on the "Method of calculating output in electrolytic processes." After discussing at no very great length a particular

case, viz. that of the electrolysis of fused sodium chloride, Mr. Blount says:

"Thus in practice he who is firmly grounded in these primary principles can deal with each particular case as it arises, not experimenting blindly, but with certain definite and exact generalisations to guide him."

This is very true, but the example taken is one in which the course of reaction is very readily followed out, and although we presume Mr. Blount does not profess to deal exhaustively with this phase of the subject, yet the section would have been much more instructive if Mr. Blount had also included an example where the main reactions are masked by secondary changes.

The next section deals with "Winning and refining of metals by electrolytic means in aqueous solutions." To the winning and refining of copper as being "the largest of all electrolytic industries" is assigned the chief place. The author has failed to treat this part of the subject with sufficient breadth. There are two main methods for obtaining copper electrolytically—the multiple system, in which the anodes and kathodes are suspended opposite to each other, and the series or Hayden system, in which at one end of the vat there is an anode plate, at the other end a kathode plate, the intervening space being occupied with plates of the same quality as the anode plate. These plates function both as anode and kathode, the surface opposite the anode acting as kathode, that opposite the kathode as anode. Mr. Blount has dealt fairly fully with the multiple system, but only very shortly with the Hayden system, which he condemns, hardly, however, giving sufficient evidence for his condemnation. Surely, also, a little more space might profitably have been devoted to the treatment of the anode sludge, the successful working up of which often goes a long way towards making an electrolytic process a paying one.

On p. 125, with reference to the difficulties met with in obtaining nickel in a state of purity, the author gives this useful warning:

"The study of the degree of purification effected by the electrolytic refining of nickel is particularly instructive, and should suffice to dispose of, once for all, the ridiculous belief that a metal prepared by electrolysis is necessarily and *ipso facto* of unusual purity."

The author is hardly correct in saying that no serious attempt appears to have been made to refine tin electrolytically. He is evidently unaware that a patent has been taken out by Mr. Claus for refining impure tin. In Mr. Claus's process, tin cast into plates is made the anode in a bath of sodium sulphide, the kathode being of tinned iron. The impurities, as well as gold and silver, remain in the anode sludge, and tin is deposited in a very high state of purity at the kathode.

Probably the third section, which treats of the electrolysis of fused salts, will be of most interest to the general reader, seeing that under this head the production of aluminium is naturally dealt with. The short section on the electric furnace, carbides and the researches of Moissan, which follows, will repay perusal, if only by pointing out the vast fields of research which the introduction of electricity to chemical processes has opened up.

Section vi., which is assigned to alkali, chlorine and their products, is extremely disappointing. This branch is, perhaps, one of the most important in the whole range of electro-chemistry, and should therefore have been treated comprehensively. The production of chlorine and caustic soda by electrolysis of common salt receives somewhat exhaustive treatment. But the important, much-worked-at and widely-debated subject of hypochlorites and chlorates, together with the practical and theoretical causes which underlie these processes, are handled most inadequately. The casual reader would carry away the impression that if a cold solution of a chloride is electrolysed without a diaphragm, a solution of a hypochlorite will be produced, but that on electrolysing at high temperatures a chlorate will be obtained. Unfortunately, the electrolysis of a chloride is by no means so simple. There is a very large amount of literature on the subject, and if Mr. Blount had endeavoured to summarise the various methods and the theories advanced, this section would have been very valuable, but he has unfortunately failed to do this.

The part devoted to electrolysis of organic compounds is short, and therefore it would be rash to expect too much from it.

The book as a whole is eminently readable, but it is doubtful whether it will be of much value to the manufacturer or practical chemist. But, in fairness to the author, let us not forget that it is extremely difficult to obtain trustworthy and authentic information of manufacturing processes; the main facts may be published, but it is often the seemingly unimportant details which make or mar a process. The value of the work to the scientific reader would have been greatly enhanced if the author had given references to the original literature from which he obtained his information. To general chemical students the book, although not entirely up to date, may be recommended, in that it deals with the newest of chemical industries in an interesting manner, and will perhaps induce some of the younger chemists to engage in this important branch of study.

F. MOLLWO PERKIN.

SCLATER'S MAMMALS OF SOUTH AFRICA.

The Mammals of South Africa. By W. L. Sclater. Vol. ii. Pp. xii+241. Illustrated. (London: Porter, 1901.)

THE first volume of this important work having been already reviewed in these columns, and its main scope and style referred to, our notice of the second and concluding volume may be comparatively brief, especially as it is chiefly devoted to the smaller mammals, such as rodents, bats and insectivora, which command a much smaller sphere of general interest than is the case with their larger terrestrial relatives.

In describing the rodents and bats, the author has been confronted with a task of considerable difficulty on account of having access to the types of many species only during short and busy visits to England. Consequently a considerable portion of this section of the work partakes in some degree of the nature of a compilation; and Mr. Sclater himself would probably be among the first to admit that some amount of revision will have to take place in the future with regard